

Remarks

A minor amendment has been made to the specification as suggested by the Examiner. Applicant has amended independent claims 1, 18 and 34 to recite the limitation of **rapid in-flight cooling of the atomized droplets in order to enhance the formation of undercooled and partially solidified droplets**. Support in the specification for these amendments is found on page 5, lines 4-15, page 12, lines 1-10, page 15, lines 5-21.

Applicant respectfully asserts that the claims, as amended, are unobvious over the combination of Bowen et al. (-043) in view of Orme et al. (-360), Alvarez et al (-853) and Garner et al.(-152). In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (when combined) must teach or suggest all the claim limitations.

In the January 15, 2003 Office action (paper 12), the Examiner described the motivation for combining Bowen et al. (-043), Orme et al. (-360), Alvarez et al (-853), and Garner et al.(-152) by stating on page 8:

Again, the proposed prior art combination would be obvious because the nozzle of Alvarez et al. (-853) would provide an alternative configuration, for the nozzle of Bowen et al. (-043), capable of spraying or atomizing liquids with **UNIFORM DROPLETS** which would overcome a known deficiency in the art (i.e., **NON-UNIFORM** Droplets) as disclosed by Orme et al (-360). (capitalization in the original).

In response to Applicant's argument that Orme et al. (-360) teaches away from the proposed combination the Examiner stated on page 9:

The examiner agrees with applicant that Orme et al (-360) discloses that uniform

droplet size is a disadvantage of spray forming and that uniform droplet size does not appear to be achievable using spray forming technologies. **However, Orme et al. (-360) does NOT disclose the ultimate conclusions that spray forming technologies CANNOT be operated in a controlled environment or that uniform droplet size CAN NEVER be achievable using spray forming technologies.** Clearly, Orme et al. (-360) teaches away from any combination wherein the nozzle provides NON-UNIFORM droplets. However, Alvarez et al. (-853) provides UNIFORM droplets. Orme et al (-360) suggest that nozzles providing uniform droplets are preferable and thus toward the proposed combination. (Capitalization in the original; bold emphasis added).

Applicant questions the relevance and appropriateness of citing Orme et al. for what it does **not** disclose (i.e., “Orme et al. (-360) NOT disclosed the ultimate conclusions that spray forming technologies CANNOT be operated in a controlled environment or that uniform droplet size CAN NEVER be achievable using spray forming technologies”.)

Instead, the relevance of Orme should be for what it does disclose. On this point, Applicant notes that Orme et al. (-360) discloses that “the spray of molten metal droplets [using a spray forming process] is for the most part uncontrolled” (col. 2, lines 36-37). The droplets within the spray cone have a wide distribution of sizes and energies (col. 2, lines 37-39). Orme et al. (-360) further teaches that the smaller droplets may arrive at the surface pre-solidified, and there would be little cohesion between the particles in the deposit, resulting in an inhomogeneous material (Column 2, lines 39-43). Finally, Orme et al. (-360) discloses that smaller intricate parts cannot be made with the spray forming method (col. 2, lines 45-46).

As stated in MPEP §2144 X.D.3, “the totality of the prior art must be considered, and proceeding contrary to accepted wisdom in the art is evidence of nonobviousness. *In re Hedges*, 783 F. 2d 1038, 228 USPQ 685 (Fed. Cir. 1986). . . Furthermore, ‘known disadvantages in old device which would naturally discourage search for new inventions may be taken into account in

determining obviousness.' " *United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1996).

Clearly, the Orme et al (-360) reference, when considered in its entirety (See: MPEP § 2141.02) teaches several deficiencies of spray forming technology and therefore does not suggest the combination of the references of Bowen et al (-043), Alvarez et al. (-853) and Garner et al. (-152).

A second criterion for establishing a *prima facie* case of obviousness is that there must be a reasonable expectation of success found in the prior art, not in Applicant's disclosure (See: MPEP §2143). Neither the Orme et al., nor any other cited reference suggests a reasonable expectation of success". In fact, Orme et al. suggest just the opposite when it recites the several disadvantages of spray forming (see col. 2, lines 32-59).

Finally, amended independent claims 1, 18 and 34 are allowable over Bowen et al. (-043), Orme et al. (-360), Alvarez et. al (-853) and Garner et al. (-152), for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every element of the claimed invention. None of the references disclose or suggest the limitation of **increasing the in-flight convection cooling of the atomized droplets thereby enhancing formation of undercooled and partially solidified droplets.**

In view of these remarks, Applicants respectfully assert that Claims 1-8, 16-24, and 32-34 are in a condition for allowance. If further action by Applicant is required to overcome the final rejection, it is respectfully requested that the Examiner contact the undersigned attorney immediately so that such requirement can be complied with expeditiously.

RESPECTFULLY SUBMITTED,

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